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PNEUMOPERITONEUM IN THE DIAGNOSIS OF PELVIC DISEASE*

GODFREY L. GALE, M.B., F.R.C.S.(Edin.)
and R. H. GIFFIN, M.O.S.R., *Weston, Ont.*

THE OBJECT OF THIS PAPER is to describe a simple technique for outlining the pelvic organs with the help of a pneumoperitoneum. It is most useful in the female pelvis where the uterus, Fallopian tubes and ovaries can often be demonstrated remarkably well. Attempts to demonstrate, for instance, the prostate gland in the male have not been so successful.

The idea for this procedure was suggested by Sante in his *Manual of Roentgenological Technique*.[1] At the time the present work was done, the authors were not aware that it had ever been used clinically, but in fact several papers have been published on this technique. Two recent ones have been concerned with the diagnosis of sex-endocrine abnormalities.[2, 3] One such case was that of 11-week-old infant who had 100 c.c. of oxygen injected into the peritoneal cavity in order to outline the pelvic organs.

INDICATIONS

This technique may be used for any female patient of any age from infancy up who has evidence of a pelvic lesion. It is perhaps specially valuable in childhood or in an unmarried woman in whom a pelvic examination, and especially a bimanual examination, is difficult. It has been used particularly in investigation of sex-endocrine disorders in children. It should be useful for differentiating uterine from ovarian neoplasms, and adnexal inflammatory masses from adnexal neoplasms.

CONTRAINDICATIONS

Perhaps the most important contraindication, especially in a tuberculosis sanatorium, is the presence of peritoneal inflammatory disease such as tuberculous salpingitis. If only one or two air injections are given, however, the danger of disseminating the infection is probably not very great.

The procedure is also contraindicated if the bowel is believed to be adherent to the anterior abdominal wall, and in cases of grave cardiac or respiratory embarrassment or general toxæmia.

GENERAL TECHNIQUE

The most important preliminary procedure is to empty the sigmoid and rectum by an enema and to make sure the bladder is empty.

The actual technique of inducing a pneumoperitoneum is perhaps too well known to warrant a detailed description here. In a child, 300-700 c.c. may be injected and in an adult 700-1,000 c.c. Room air is generally used. A single injection may be adequate if the radiographs are taken immediately, but a second or third injection of the same amount of air at two-day intervals may be necessary to build up sufficient intraperitoneal air. A short, gauge 18 needle with not too sharp a bevel is used, and is inserted under local anæsthesia into the peritoneal cavity at the lateral border of the left rectus abdominis muscle just above the umbilicus.

RADIOGRAPHIC TECHNIQUE

The patient lies prone on the x-ray table with the head of the table tilted down 50 to 60 degrees. This allows the air in the peritoneal cavity to ascend into the pelvis, and so separate the uterus and tubes from the bladder. The x-ray tube is aimed down vertically at the floor. Additional oblique views may be useful. The average exposure is that used for a flat film of the abdomen, i.e., 100 mA. and 70 kV. at 36-inch (90 cm.) distance.

CASE HISTORIES

The following were all patients under treatment for pulmonary tuberculosis at the Toronto Hospital for Tuberculosis, Weston, Ontario. In one instance (Case 4) the pneumoperitoneum was induced specially. The other cases were already receiving pneumoperitoneum therapeutically and agreed to undergo the preparation necessary for this investigation.

CASE 1. (Fig. 1).—L.F., a 28-year-old married white woman with one daughter aged 5. Menstrual periods were normal, lasting seven days and with a cycle of 30 days. Pelvic examination was negative apart from a small cervical erosion. The pelvic radiograph was normal.

CASE 2. (Fig. 2).—R.G., a 20-year-old single white woman. Menstrual history normal. Pelvic examination not done. The pelvic radiograph showed the small uterus of a young nullipara.

CASE 3. (Figs. 3 and 4).—O.G., a 20-year-old single white woman. The menarche occurred at the age of 12. She had six months' amenorrhœa at the onset of her

*From the Toronto Hospital for Tuberculosis, Weston, Ont.

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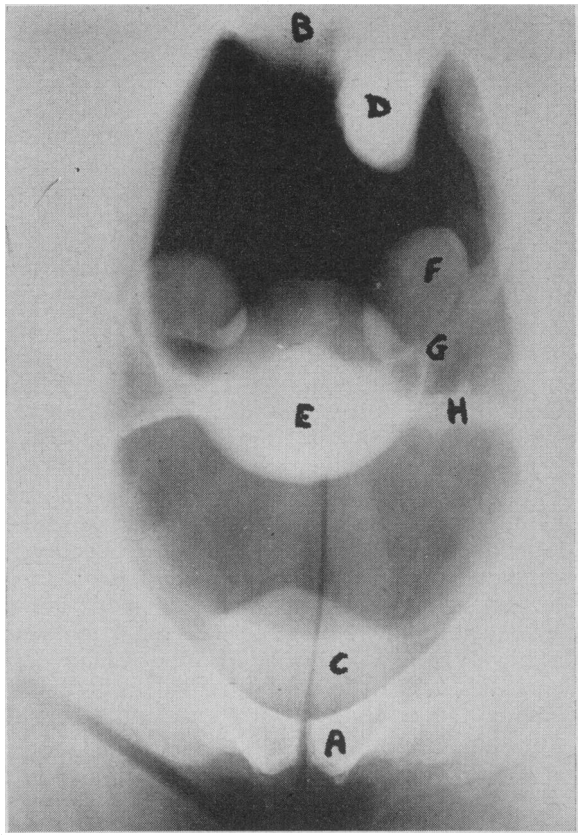


Fig. 1.—L.F., normal parous pelvis. A—symphysis pubis. B—promontory of sacrum. C—bladder. D—rectum. E—uterus. F—left ovary. G—Fallopian tube. H—round ligament.

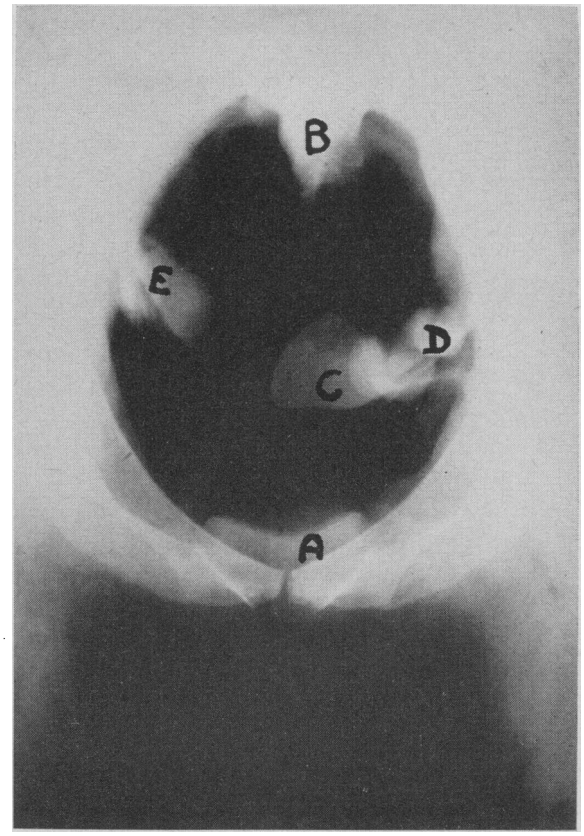
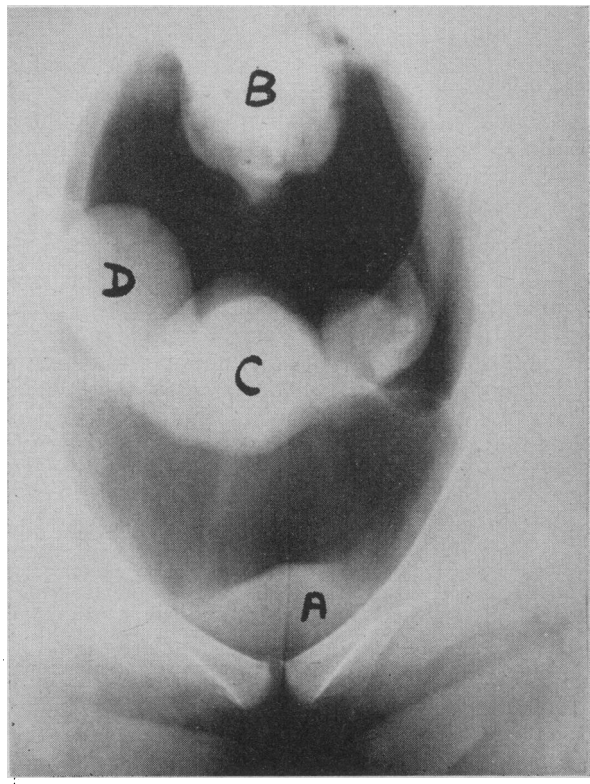


Fig. 2.—R.G., normal pelvis in a young nullipara. A—bladder. B—rectum. C—uterus. D—left ovary. E—right ovary.



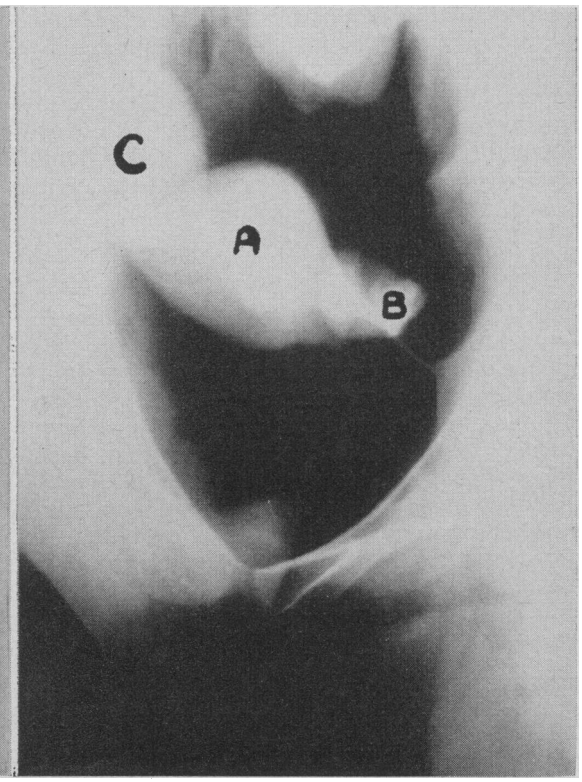


Fig. 3.—O.G., enlargement of the right ovary. A—bladder. B—rectum. C—uterus. D—smooth regular enlargement of the right ovary. Fig. 4.—Enlargement of the right ovary, oblique view. A—uterus. B—left ovary. C—enlarged right ovary.

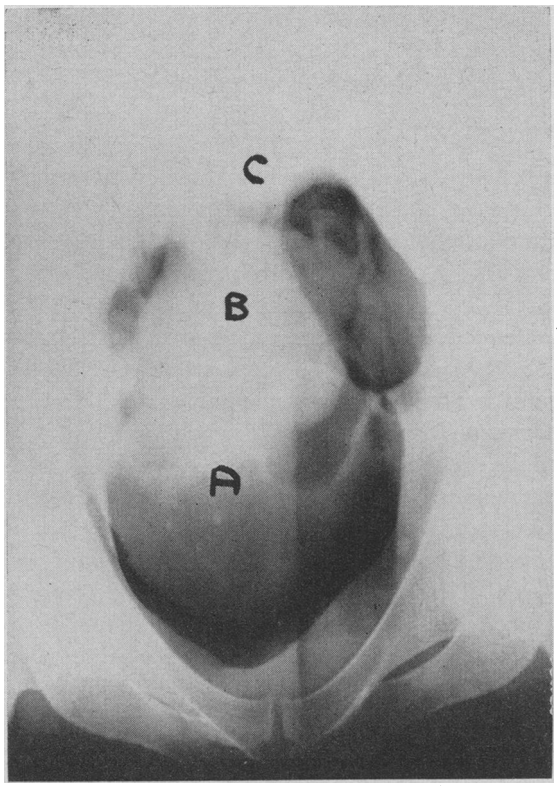


Fig. 5.—E.B., fibroids. A—large fibroid on anterior surface of the uterus. B—uterus displaced backwards. C—rectum.

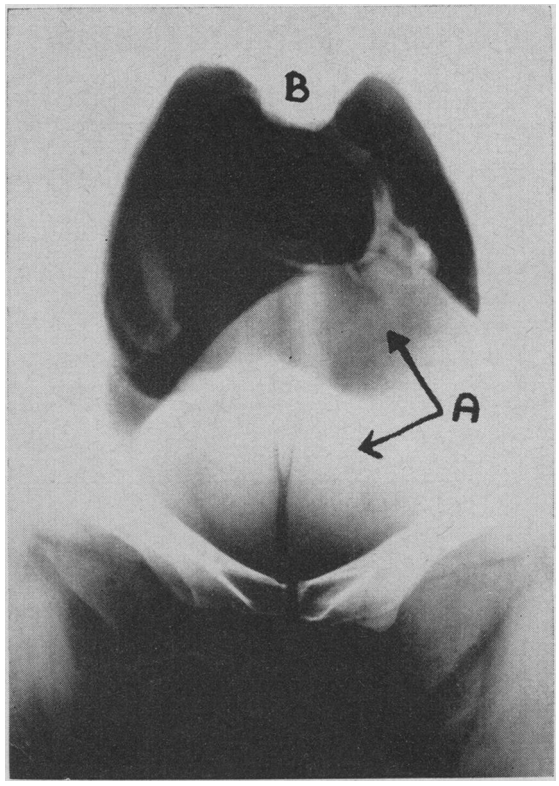


Fig. 6.—Patient inadequately prepared. A—distended bladder. B—promontory with a loop of sigmoid colon distended with gas lying in front of it.

pulmonary tuberculosis a year previously, but her periods were now normal, lasting four days and with a cycle of 28 days. The A.P. and left oblique pelvic radiographs showed a regular, smooth enlargement of the right ovary. She declined, however, to have either a pelvic or even a rectal examination, and in the absence of symptoms the matter was not pursued further.

CASE 4. (Fig. 5).—E.B., a 44-year-old married white woman. She had one daughter aged 24 and there was a miscarriage 20 years ago. Menstrual periods were regular but for the past six years had lasted for five to seven days and had been heavy with the passage of clots. Pelvic examination showed a hard nodular mass in the pelvis probably attached to the anterior surface of the body of the uterus and pushing the uterus back. The diagnosis was fibroids. The pelvic radiograph showed a large round mass attached to or growing from the uterus. Laparotomy by Dr. Nelson Henderson at the Toronto General Hospital showed a large uterine fibroid and hysterectomy was carried out.

CASE 5. (Fig. 6).—This radiograph shows the result of inadequate preparation; the bladder is distended and there is gas in the sigmoid and rectum. The patient was a 28-year-old nullipara with prolapse for which a vaginal hysterectomy was later carried out.

SUMMARY

This paper describes a simple technique for outlining the pelvic organs in the female. Any age from infancy up may be suitable and it is perhaps most valuable—when required—in children and the unmarried, where pelvic examination is difficult. The chief contraindication is the presence of peritoneal inflammatory disease such as a tuberculous salpingitis.

We wish to express our indebtedness to Dr. C. A. Wicks, superintendent, Toronto Hospital for Tuberculosis, Weston, Ontario, Dr. Nelson Henderson, consultant in gynæcology and obstetrics, and Dr. W. J. Cryderman, radiologist. Our thanks are due also to Mr. Harold Layne for the photographs.

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MEGACESOPHAGUS

Cardiospasm, achalasia and megacesophagus are used as interchangeable terms for a disease characterized by dysphagia and dilatation of the œsophagus. But megacesophagus is characterized by tonic contraction of the terminal œsophagus with dilatation proximally. Treatment should be by linear œsophagomyotomy; relief thus obtained is quite satisfactory as shown by 20 cases. The operation is done through a transthoracic approach and in this way differs from the Heller operation.—D. B. Effler and J. W. Rogers: *A.M.A. Arch. Surg.*, 71: 551, 1955.